GOES-R Proving Ground

NOAA's Storm Prediction Center and Hazardous Weather Testbed

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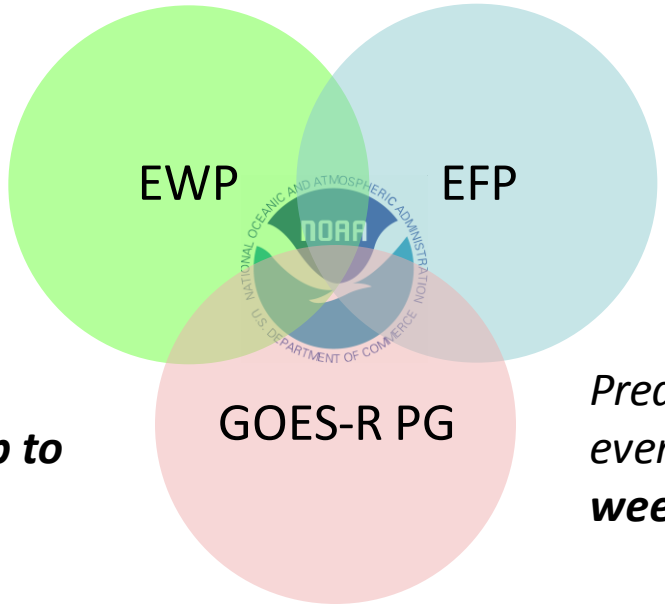
7th GOES Users' Conference

Birmingham, AL – 20 October 2011

NOAA's Hazardous Weather Testbed

Experimental
Warning
Program

Detection and prediction of hazardous weather events ***up to several hours in advance***



Experimental
Forecast
Program

Prediction of hazardous weather events from ***a few hours to a week in advance***

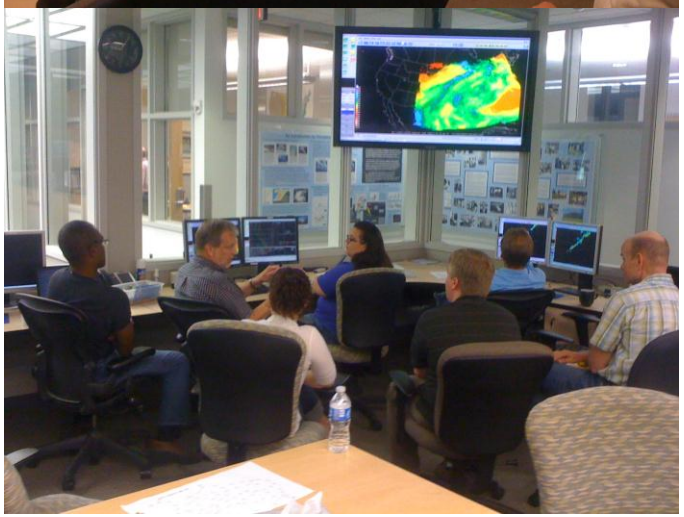
NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE
NASA
GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE R-SERIES GOES R NOAA ~ NASA
NATIONAL SEVERE STORMS LABORATORY
Storm Prediction Center Norman, Oklahoma

Proving Ground Goals at the HWT

- Demonstrate products and capabilities available on GOES-R within an operational forecast / warning environment
  - Severe Weather (forecast and warning), QPF, Convective Initiation, and Fire Weather
- Build connections with non-satellite research community
  - Radar (dual-pol, MRMS), NWP, and Lightning (LMA)
- Discover product, display and demonstration limitations / successes and suggest improvements
- Define product training and display requirements
- Accelerate the R2O (and O2R) process for current satellite decision support tools
  - Expose the satellite research community to operational challenges

2011 Spring Experiment

- 5-week period (9 May – 10 June)
  - During central plains peak severe weather season
  - Main focus on severe, QPF and CI
- 24 NWS forecasters and many visiting scientists participated
- 8 Proving Ground products demonstrated
- Real-time forecast and warning exercises using operational decision support tools
  - N-AWIPS, AWIPS and AWIPS-II
- Weather Event Simulator (WES) cases developed for training purposes

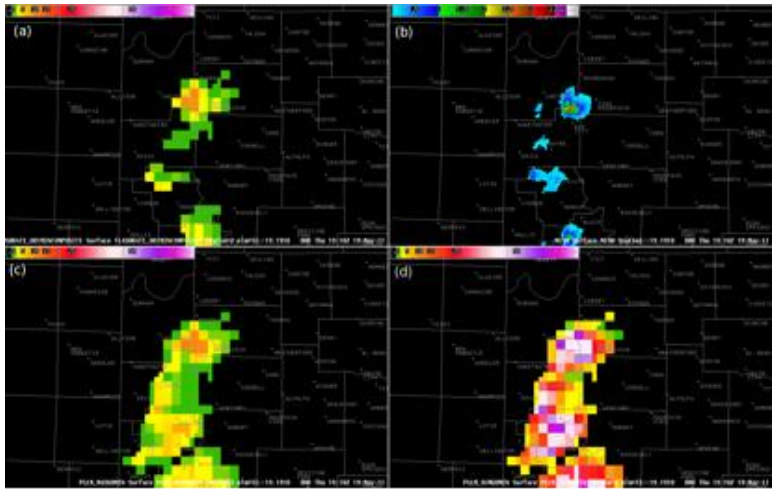


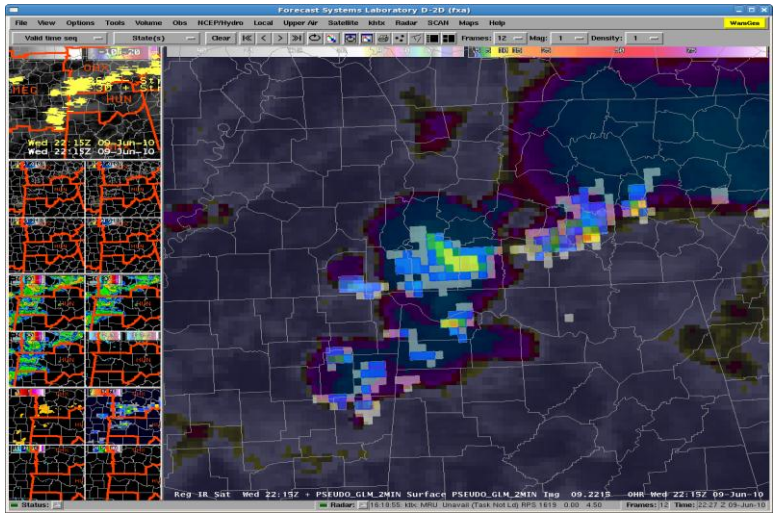
Capturing Feedback

- GOES-R HWT Blog…
  http://goesrhwt.blogspot.com/
- Web-based surveys
  - 51% EWP forecasters reported increased confidence in satellite products
    - Only 5% reported decreased confidence
- Daily post-mortem discussions
- Final reports
  - 2011 Spring Experiment available
  - 2011 Fire Weather Experiment in development

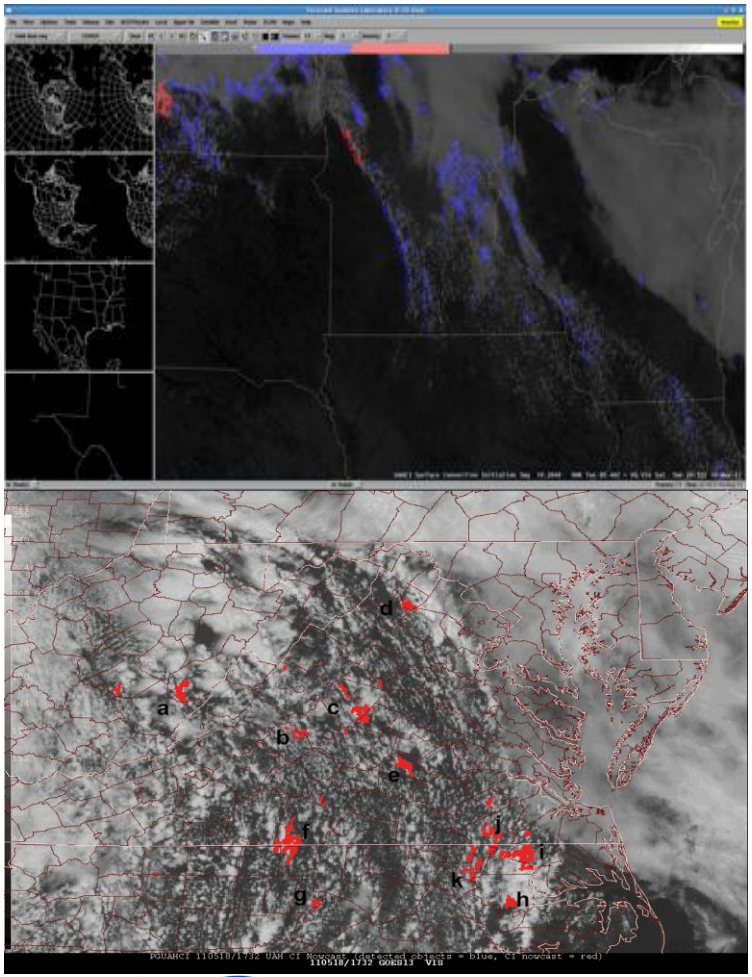
Total Lightning Detection

- Pseudo-Geostationary Lightning Mapper (PGLM)
  - Products available for 2011:
    - Instantaneous flash extent density
    - Instantaneous flash initiation density
    - 60-minute max track
    - 60-minute accumulated track
  - "The pseudo-GLM was very useful in that it focused attention on storm intensification, and was able to pick up on flash rates much earlier than the CG network."
  - 52% EWP forecasters reported comfortable with PGLM following training



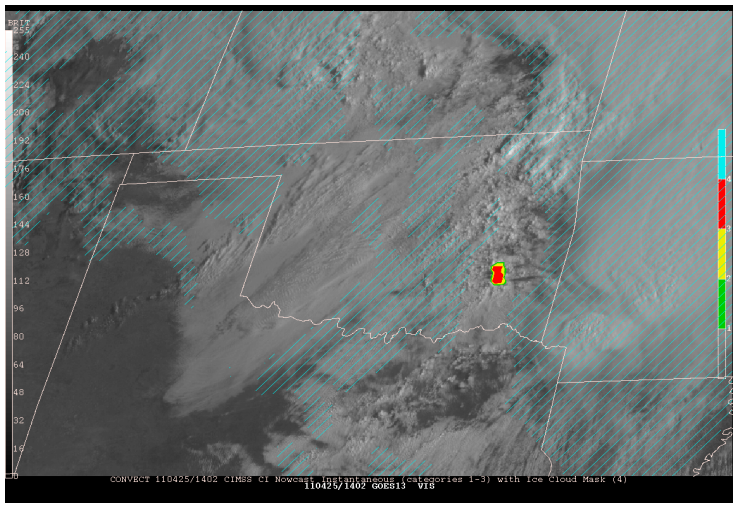


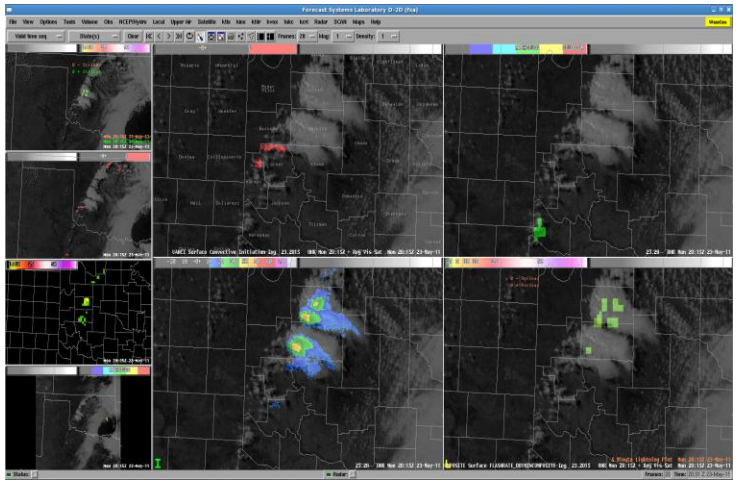
Convective Initiation



- SATCAST V.2
  - Removed blue cloud identification confusing to forecasters…
    - "The (SATCAST) performance was useful as a temporal signal… in the sense that enhanced 'regions' of growing cumulus. However, the Yes-No values were not useful, especially when values went back and forth from blue to red to blue. Consider adding more values, and the values themselves to allow forecasters to monitor these values and interpret these based on their own experience."
  - 77% EWP forecasters reported using SATCAST during forecast/warning operations
  - 80% EWP forecasters reported comfortable with SATCAST following training

Convective Initiation cont'd

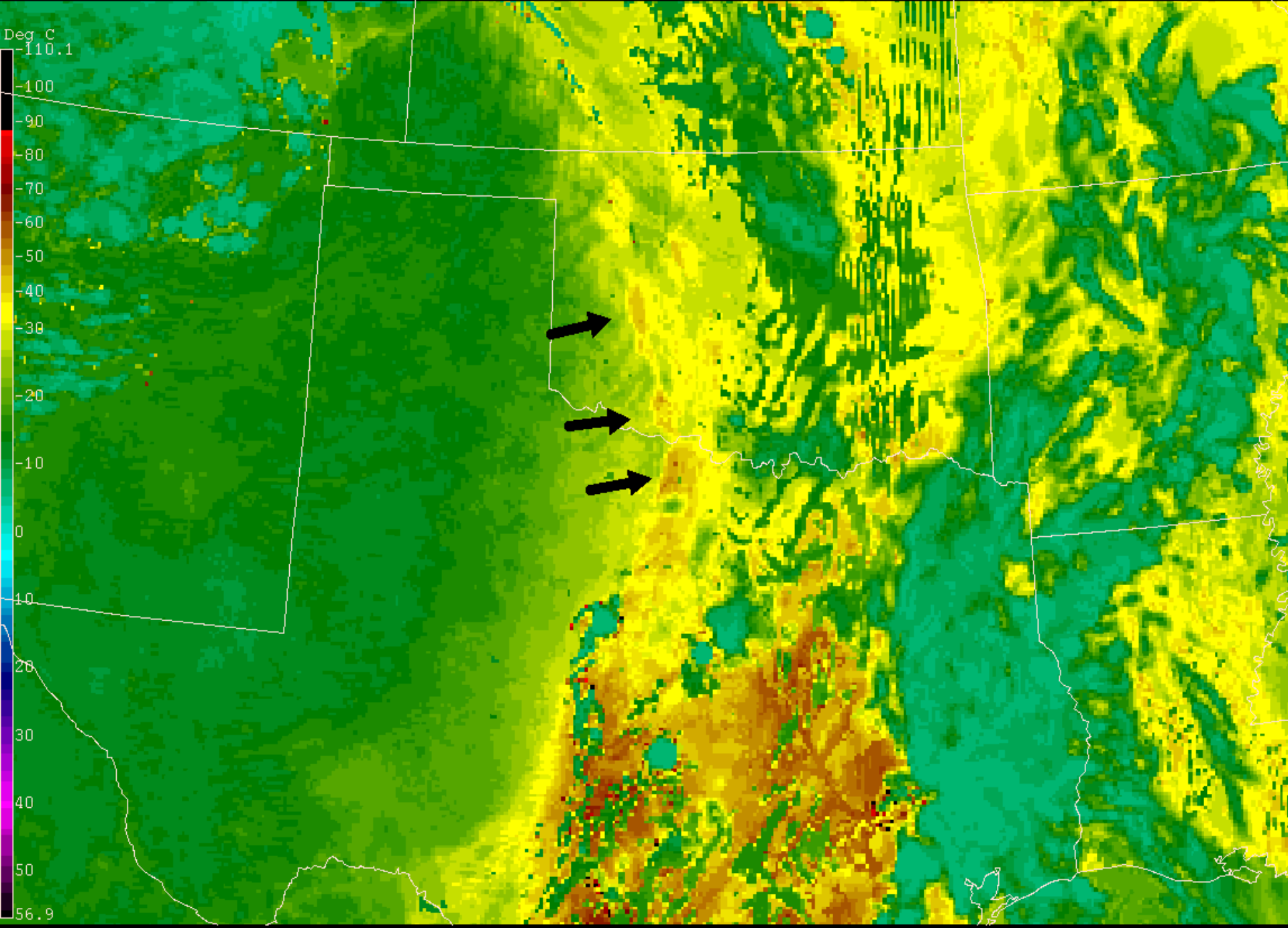


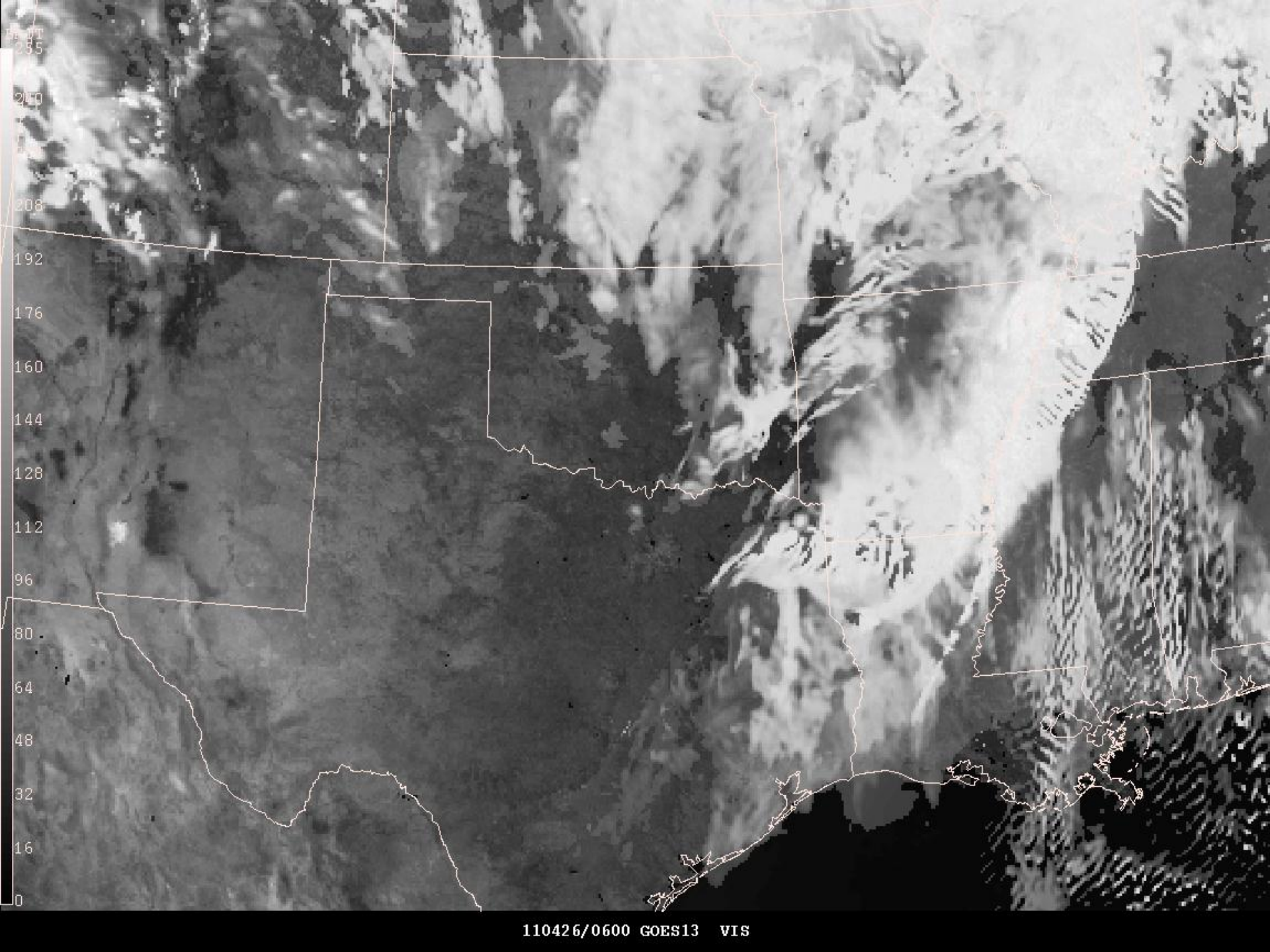


- UWCI / Cloud-top Cooling Rate
  - Added cloud mask at the request of forecasters from 2010 Spring Experiment
  - 71% EWP forecasters reported using UWCI during forecast/warning operations
  - 75% EWP forecasters reported comfortable with UWCI following training
- Overall
  - Created "Ultimate-CI" AWIPS 4-panel
    - UWCI, SATCAST, PGLM, and MRMS reflectivity at -10 C
  - "Even though CI didn't always occur... false hits were useful in identifying clouds trying to break the cap."

Simulated Satellite Imagery / Lightning Threat

- Produced from the 0Z 4km NSSL-WRF
  - All 9 non-solar ABI IR bands
  - Visible band
  - Band differences
  - Total lightning threat
  - Hourly output available for 12-36 hr forecast periods for imagery, 0-36 hr forecast periods for lightning threat
  - Most imagery available locally by 12Z


Deg C
-110.1
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
56.9
110511/1900 GOES13 IR4


208
192
176
160
144
128
112
96
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64
48
32
16
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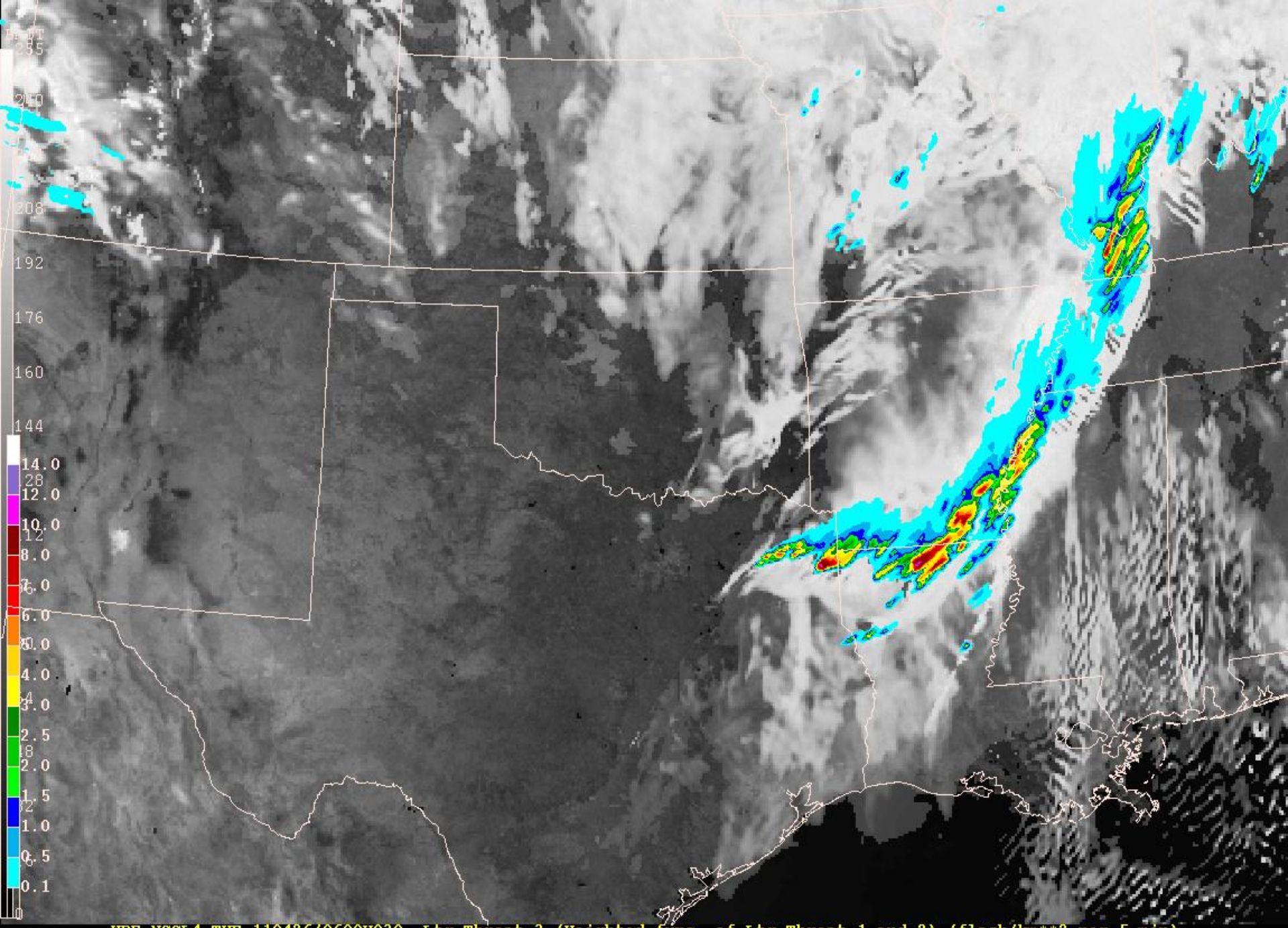
110426/0600 GOES13 VIS


255
240
224
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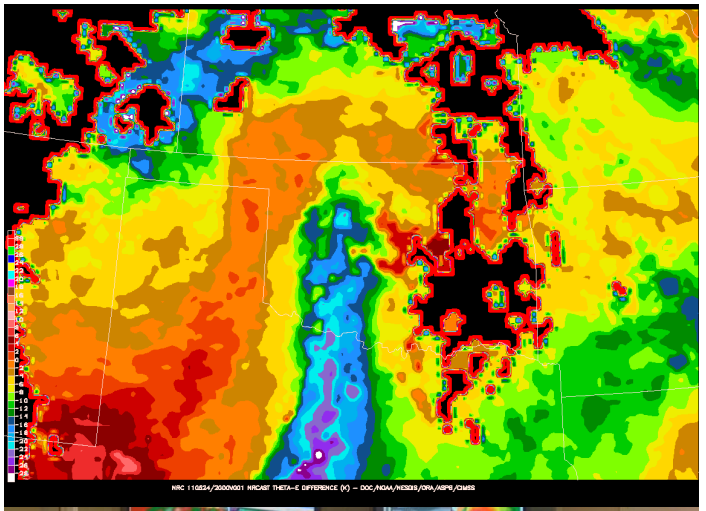
192
176
160
144
14.0
28
12.0
10.0
12
8.0
6.0
6.0
4.0
3.0
2.5
2.0
1.5
1.0
0.5
0.1
0
WRF-NSSL4 TUE 110426/0600V030 Ltg Threat 3 (Weighted func. of Ltg Threat 1 and 2) (flash/km**2 per 5 min)
110426/0600 GOES13 VIS

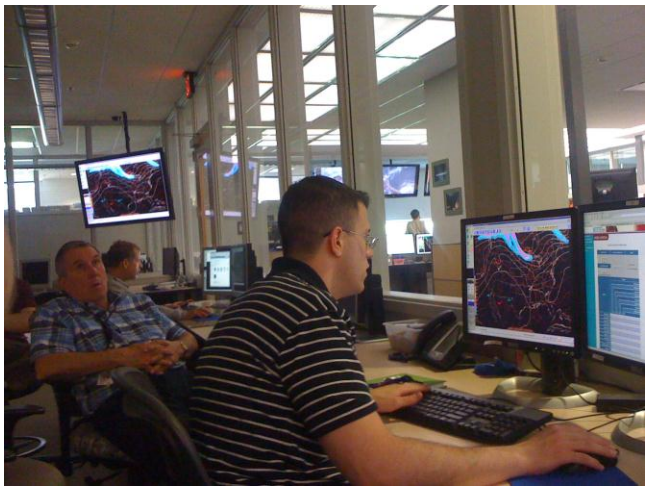
Differential Theta-E / PW Nearcast

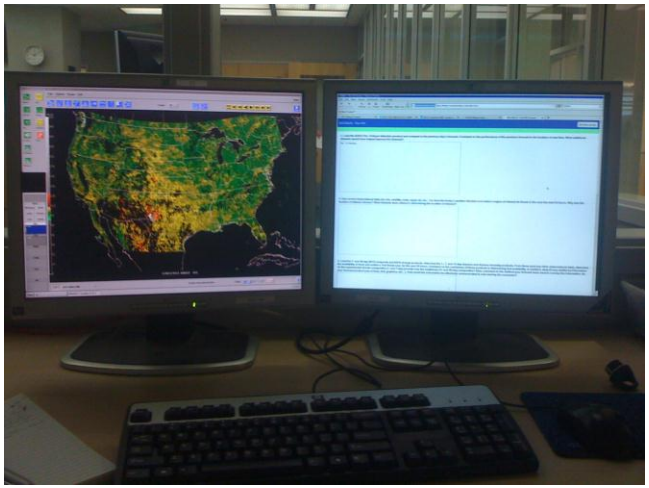
- GOES sounder PW / theta-e fields advected using a Lagrangian model
  - Up to 9-hour forecast
    - "I can see the utility in using this product to diagnose how convective instability is evolving with time (keeping its limitations in mind). However, I would rely more on trends than on raw numbers."
    - "Initial convection in area of responsibility was correlated with higher values as indicated by vertical precipitable water difference products."
  - Also often utilized in 0-2 hour warning operations
  - 41% EWP forecasters reported using Nearcast during forecast/warning operations
  - 42% EWP forecasters reported comfortable with Nearcast following training

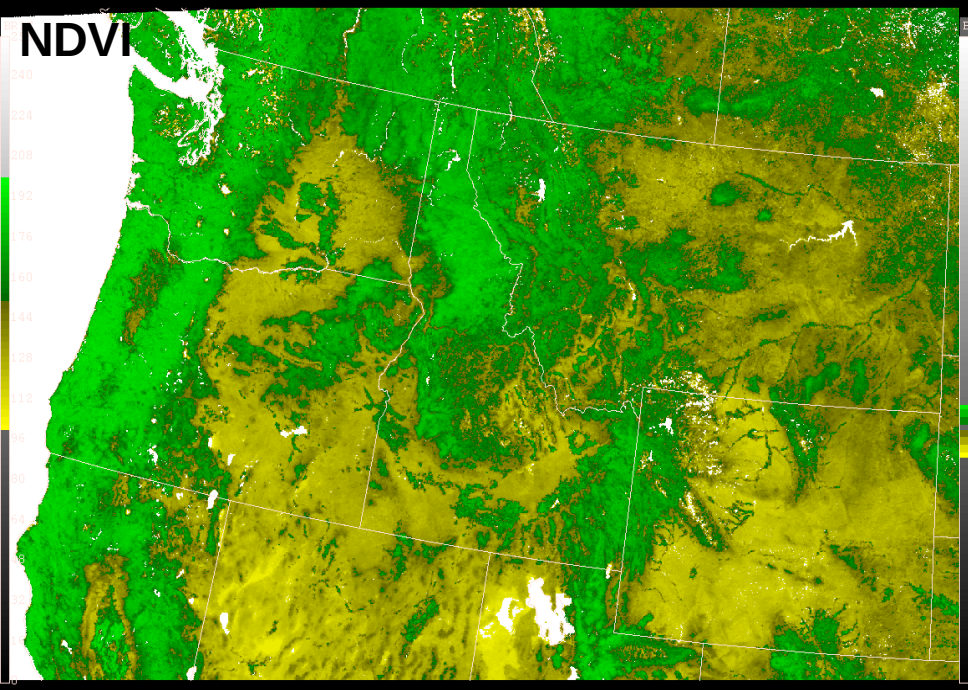


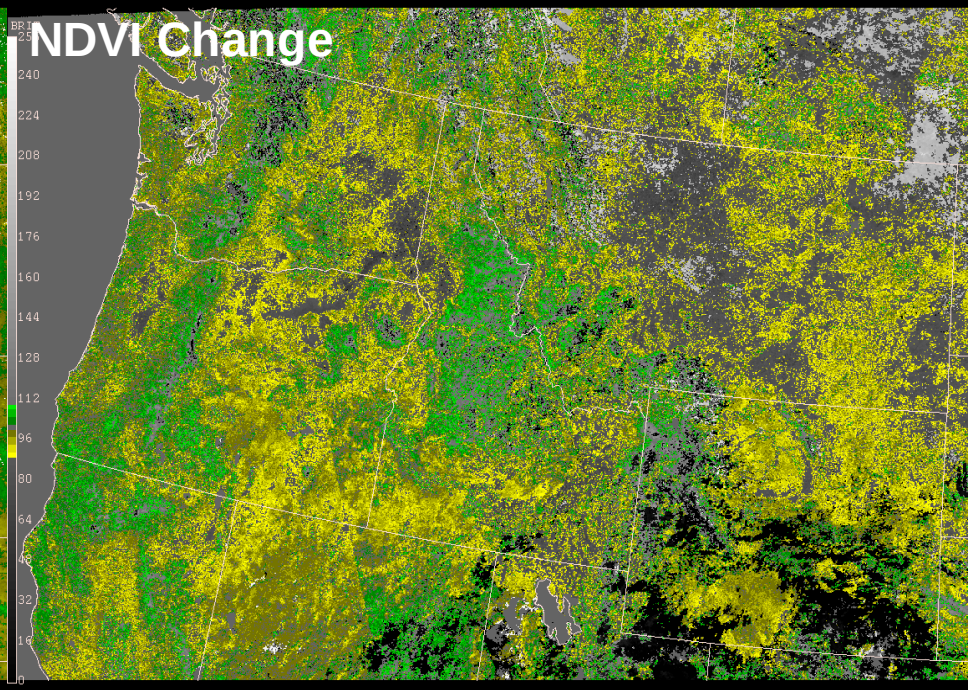
2011 Fire Weather Experiment

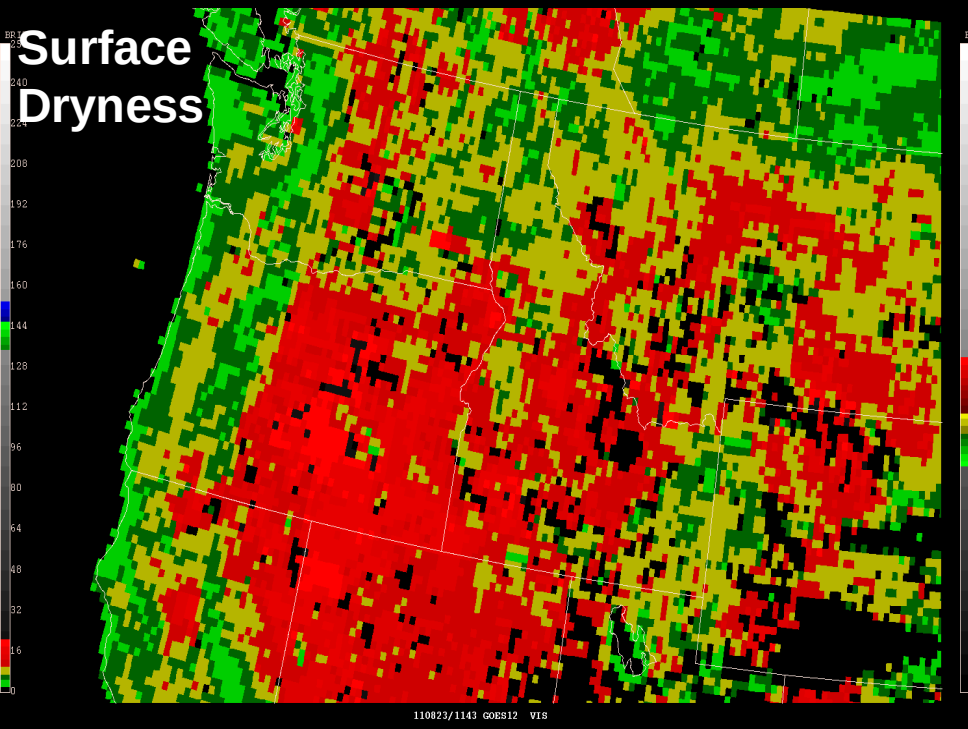
- 2-week period (22 Aug. – 2 Sept.)
  - During western US fire weather season
  - Main focus on dry thunder forecasting
- 6 NWS forecasters and several internal guests participated
  - SPC and Norman WFO
- 6 Proving Ground products demonstrated
- Real-time fire weather forecasts using N-AWIPS
  - Forecast 24-hour burnable fuels and dry thunder threat

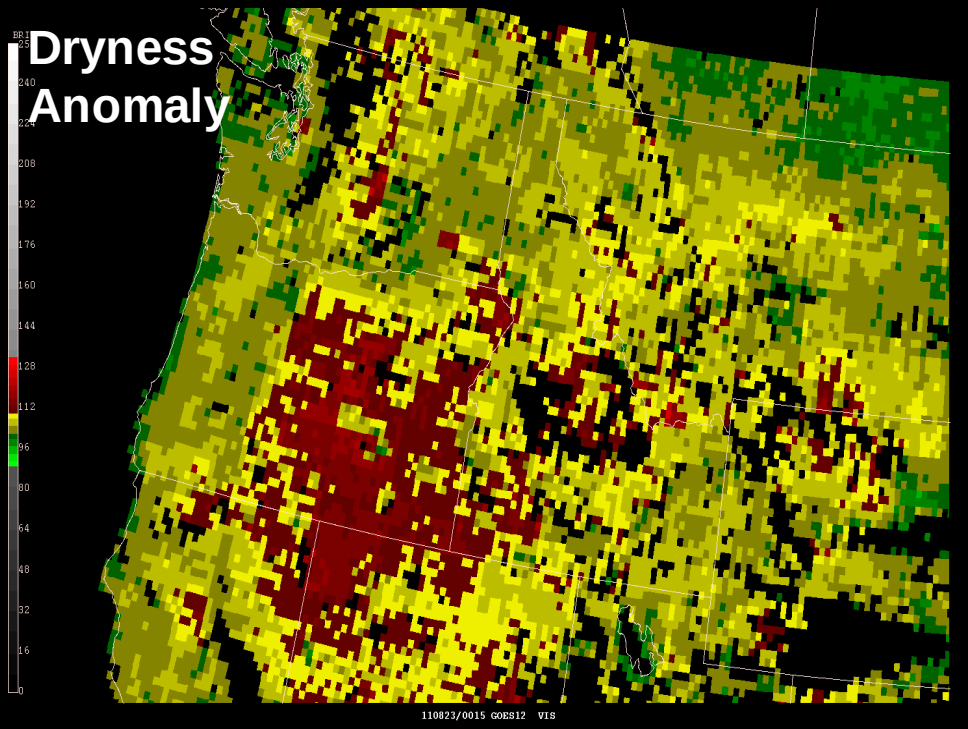





NDVI
110815/2157 GOES12 VIS


NDVI Change
110815/2157 GOES12 VIS


Surface
Dryness
110823/1143 GOES12 VIS


Dryness
Anomaly
110823/0015 GOES12 VIS

Thank you for your attention!

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GOES-R Websites:

http://www.goes-r.gov/

http://www.facebook.com/goesrpg

http://www.facebook.com/GOESRsatellite

http://goesrhwt.blogspot.com